

Observations of Occultations of Stars by the Moon, and of Phenomena of Jupiter's Satellites, made at the Royal Observatory, Greenwich, in the Year 1878.

(Communicated by the Astronomer Royal.)

Occultations of Stars by the Moon.

Day of Obs.	Phenomenon.	Telescope.	Power.	Moon's Limb.	Mean Solar Time of Observation. h m s	Observer.
1878. Mar. 16	Disapp. of A Leonis	Altaz.	100	Dark	9 57 16.5	T
June 5	„ π^2 Cancri	E. Eq.	140	„	8 54 16.6	„
Sept. 6	„ h^1 Sagittarii	„	„	„	7 32 27.8	HP
Nov. 10 (a)	„ 17 Tauri	S.E. Eq.	285	Bright	9 31 19.5	WC
„ (b)	„ 20 Tauri	„	„	„	10 23 17.0	„
„ (c)	Reapp. 17 Tauri	„	„	Dark	10 46 40.9	„
„	Disapp. η Tauri	E. Eq.	140	Bright	11 11 16.0	GP

Notes.

- (a) The star disappeared gradually in a sort of luminous haze surrounding the Moon's limb, which seemed to retire from the star for a space of three or four seconds of time. Just before disappearing the star was seen apparently bisected by the limb.
- (b) The star disappeared gradually at the Moon's bright limb; observed with a graduated dark shade.
- (c) Reappeared instantaneously.

Phenomena of Jupiter's Satellites.

Day of Obs.	Satellite.	Phenomenon.	Telescope.	Power.	Mean Solar Time of Observation. h m s	Mean Solar Time from N.A. h m s	Observer.
1878. July 4	III	Tr. ing. first contact	E. Eq.	140	13 8 26.2	13 12	C
17	I	Occ. reapp. first contact	„	„	13 58 45.8	14 0	AD
„	I	„ bisection	„	„	14 0 15.5		
„	I	„ last contact	„	„	14 2 0.2		
18	I	Tr. egr. last contact	„	„	11 7 18.4	11 10	T
„	II	Ecl. disapp.	„	„	11 58 50.0	11 59 43	„
29	III	Occ. disapp. first contact	„	„	12 40 49.5	12 41	C
Aug. 17 (d)	I	Tr. ing. first contact	S.E. Eq.	220	10 11 23.7	10 12	M
„	I	„ bisection	„	„	10 14 5.2		
„	I	„ last contact	„	„	10 16 24.8		
„ (e)	I	Tr. egr. first contact	„	„	12 28 24.2	12 32	„
„	I	„ bisection	„	„	12 30 58.8		
„	I	„ last contact	„	„	12 33 33.3		

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Day of Obs.	Satellite.	Phenomenon.	Telescope.	Power.	Mean Solar Time of Observation.			Mean Solar Time from <i>N.A.</i>			Observer.
					h	m	s	h	m	s	
1878. Aug. 19	(f) II	Occ. disapp. first cont.	E. Eq.	140	10	16	59.5	10	21		R
"	II	" bisection	"	"	10	19	4.1				
"	II	" last cont.	"	"	10	21	13.8				
26	(g) I	Tr. egr. first contact	"	"	8	40	29.1	8	44		C
"	I	" last contact	"	"	8	43	19.7				
27	(h) III	Ecl. reapp. first seen	S.E. Eq.	220	8	43	2.5	8	45	54	M
"	III	" dichotomised	"	"	8	44	52.2				
"	III	" full brightness	"	"	8	46	51.9				
Sept. 3	(i) I	" first seen	"	"	8	43	18.4	8	43	16	WC
"	I	" full brightness	"	"	8	44	39.2				
"	(k) III	Occ. reapp. first appearance	"	"	9	1	43.4	9	8		"
"	III	" bisection	"	"	9	3	26.1				
"	III	" last contact	"	"	9	4	55.8				
"	III	Ecl. disapp. first obs.	"	"	9	12	54.5	9	18	4	"
"	(l) III	" disappearance	"	"	9	16	38.9				
6	(m) II	Ecl. reapp. first seen	E. Eq.	140	8	58	5.0	8	58	39	HP
"	II	" half brightness	"	"	8	59	12.8				
"	II	" full brightness	"	"	9	0	2.7				
18	(n) I	Tr. egr. first contact	S.E. Eq.	220	8	32	46.2	8	36		M
"	I	" bisection	"	"	8	36	0.6				
"	I	" last contact	"	"	8	39	5.1				
"	(o) I	" last contact	E. Eq.	140	8	41	11.7	8	36		W
"	IV	Ecl. reapp. first seen	S.E. Eq.	220	9	25	9.3				
"	(p) IV	" dichotomised	"	"	9	28	47.0	9	34	49	M
"	IV	" full brightness	"	"	9	32	56.3				
"	(q) IV	" first seen	E. Eq.	140	9	27	59.0	9	34	49	W
"	IV	" dichotomised	"	"	9	29	33.7				
"	(r) IV	" first seen	Altaz.	100	9	29	38.1	9	34	49	C
19	I	" first seen	"	"	7	3	3.9				
20	II	Occ. disapp. first cont.	E. Eq.	140	8	57	3.8	8	58		C
"	II	" last contact	"	"	9	0	18.2				
26	(s) IV	Tr. egr. last contact	S.E. Eq.	220	8	6	0.5	8	25		WC
"	(t) I	Ecl. reapp. first seen	"	"	8	58	3.9				
"	I	" half brightness	"	"	8	58	51.8	8	58	7	"
"	I	" full brightness	"	"	9	0	1.6				
"	I	" first seen	E. Eq.	140	8	58	14.8	8	58	7	J
"	I	" half brightness	"	"	8	59	17.7				
"	I	" full brightness	"	"	9	0	27.5				

Day of Obs.	Satellite.	Phenomenon.	Telescope.	Power.	Mean Solar Time of Observation. h m s	Mean Solar Time from N.A. h m s	Observer
1878.							
Oct. 11 (u)	I	Tr. ing. first contact	S.E. Eq.	285	6 22 2'3	6 20	M
"	I	" bisection	"	"	6 24 31'9		
"	I	" last contact	"	130	6 26 41'6		
18	I	Tr. ing. first contact	E. Eq.	140	8 11 41'6	8 15	J
"	I	" bisection	"	"	8 14 41'1		
"	I	" last contact	"	"	8 18 20'5		
23 (v)	III	Occ. disapp. bisection	S.E. Eq.	220	7 52 12'0	7 58	WC
24 (w)	II	Tr. egr. last contact	E. Eq.	140	6 34 41'5	6 28	AD
Nov. 2	II	Ecl. reapp. first seen	"	70	5 56 0'6	5 56 25	"
"	II	" full brightness	"	140	5 58 24'2		
11 (x)	I	Occ. disapp. first contact	"	"	5 54 54'2	5 55	"
"	I	" bisection	"	"	5 55 44'1		
"	I	" last contact	"	"	5 56 48'9		

Notes.

- (d) *Jupiter* was occasionally very well defined, especially at the first contact. The limb of the planet became afterwards very boiling and rugged. The satellite was very brilliant on the disk.
- (e) Limb tremulous. The satellite did not appear so bright as at ingress.
- (f) The planet well defined.
- (g) The image of the planet very bad.
- (h) *Jupiter* and the satellites were very tremulous. The time noted at "first seen" may be two or three seconds late.
- (i) Pretty exact; a very minute speck when first seen; the Airy eye-piece used throughout.
- (k) The time noted at first appearance is pretty exact.
- (l) A very faint speck at time of disappearance.
- (m) Satisfactory.
- (n) Very tremulous, especially at the last contact.
- (o) The image very diffused; the observation difficult.
- (p) The times recorded at "dichotomised" and at "full brightness" were a little early; probably they should be increased by 20". Images very tremulous.
- (q) Rather late; the time recorded at full brightness is also uncertain, owing to tremor and diffusion.
- (r) Not certain; thin clouds were continually passing.
- (s) The satellite was not seen a few minutes before the last contact when on the disk. Definition very bad. The Airy eye-piece used.
- (t) Increased very rapidly in brightness in the next two or three seconds.
- (u) Very tremulous; definition bad.
- (v) Not satisfactory; the planet was only seen for about a minute, the sky being cloudy at the first and last contacts. The Airy eye-piece used.
- (w) The first phases could not be observed, owing to the bad image.
- (x) Definition good.

The clear aperture of the object-glass of the S.E. Equatoreal is $12\frac{3}{4}$ inches, of the East Equatoreal 6·7 inches, and of the Altazimuth $3\frac{3}{4}$ inches.

The initials WC, C, AD, M, T, W, HP, R, GP, and J, are those of Mr., Christie, Mr. Criswick, Mr. Downing, Mr. Maunder, Mr. Thackeray, Mr. Wickham, Mr. Pead, Mr. Robinson, Mr. Pearce, and Mr. James.

*Royal Observatory, Greenwich,
1878, December 31.*

*Ephemerides for Determining the Positions of the Satellites of Uranus,
1879.*

By A. Marth, Esq.

Angles of position, p , of the major axes and logarithms of the major and minor semi-axes, a and b , of the apparent orbits of the satellites.

Greenwich. Noon. 1879.	p_0 °	Ariel.		Umbriel.		Titania.		Oberon.	
		log a	log b	log a	log b	log a	log b	log a	log b
Jan. 25	13·03	1·1808	0·5110	1·3248	0·6550	1·5397	0·8699	1·6660	0·9961
30	12·99	·1818	·5185	·3258	·6625	·5407	·8774	·6669	1·0036
Feb. 4	12·95	·1825	·5260	·3265	·6699	·5414	·8848	·6677	·0111
9	12·90	·1831	·5334	·3271	·6774	·5420	·8923	·6682	·0185
14	12·85	·1835	·5407	·3275	·6847	·5424	·8996	·6686	·0258
19	12·81	·1837	·5479	·3277	·6918	·5426	·9068	·6688	·0330
24	12·76	·1837	·5547	·3277	·6967	·5426	·9136	·6688	·0399
Mar. 1	12·71	1·1835	0·5613	1·3275	0·7052	1·5424	0·9201	1·6686	1·0464
6	12·66	·1831	·5674	·3271	·7113	·5420	·9262	·6683	·0525
11	12·61	·1826	·5730	·3265	·7170	·5414	·9319	·6677	·0581
16	12·57	·1818	·5781	·3258	·7221	·5407	·9370	·6669	·0631
21	12·52	·1809	·5826	·3249	·7266	·5398	·9415	·6660	·0677
26	12·48	·1798	·5866	·3238	·7305	·5387	·9455	·6649	·0717
31	12·44	·1786	·5899	·3225	·7339	·5375	·9488	·6637	·0750
Apr. 5	12·41	1·1772	0·5925	1·3212	0·7365	1·5361	0·9514	1·6623	1·0777
10	12·38	·1757	·5945	·3197	·7385	·5346	·9534	·6608	·0797
15	12·36	·1741	·5959	·3180	·7399	·5330	·9548	·6592	·0810
20	12·34	·1724	·5966	·3163	·7405	·5312	·9554	·6575	·0817
25	12·32	·1706	·5966	·3145	·7405	·5294	·9555	·6557	·0817
30	12·31	·1687	·5959	·3127	·7399	·5276	·9548	·6538	·0810
May 5	12·30	1·1668	0·5946	1·3107	0·7386	1·5257	0·9535	1·6519	1·0798
10	12·30	·1648	·5927	·3088	·7367	·5237	·9516	·6499	·0778
15	12·31	·1628	·5902	·3068	·7341	·5217	·9490	·6480	·0753
20	12·32	·1608	·5870	·3048	·7309	·5197	·9459	·6460	·0721
25	12·34	1·1589	0·5832	1·3028	0·7271	1·5178	0·9420	1·6440	1·0683

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